

## ***Source Category Listing for the Arizona HAPRACT Rule***

***Presented to***  
**Arizona HAP Stakeholders**  
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***Presented by***  
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### ***Objectives***

- Review air dispersion modeling approach for classifying SIC codes
- Explain resolutions of issues encountered in the modeling process not included in original approach
- Illustrate modeling process for example facilities

## ***SIC Codes and Inventories***

- List of candidate SIC codes in Arizona
  - Toxics Release Inventory (TRI)
  - Arizona HAP Inventory
  - At least 1 TPY single HAP or 2.5 TPY total HAPs
- HAP emission quantities and emission point data from readily available sources
  - Arizona I-STEPS Emissions Database
  - Maricopa, Pima, and Pinal County Agencies
  - ADEQ Permits & Modeling Files

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## ***Modeling Approach***

- Specific HAP compound emissions matched to specific emission points at each facility
  - Fullest extent allowed by information available
  - Actual emission points used where identifiable
  - Surrogate emission points used otherwise
- Use screening modeling approach to determine potential for ambient air impacts in excess of the AACs

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## ***Air Dispersion Modeling***

- USEPA SCREEN3 model used
  - Most recent version (96043)
  - Screening version of refined ISC3 model
- SCREEN3 model options used
  - Regulatory mixing height & cavity options
  - Default anemometer height (10 m) (32 ft)
  - Flat simple terrain
  - Rural dispersion
  - Default ambient temperature (293 K) (68 F)
  - Full meteorology (54 wind speed/stability combinations)

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## ***Air Dispersion Modeling***

- Receptor distances automatically generated
  - Assumed Process Area Boundary (PAB) at 25 meters (82 ft) for all sources
  - PABs were not readily identifiable from aerial photos
- Buildings
  - Used actual dimensions if available
  - If actual dimensions not available, attempted to obtain approximate horizontal dimensions from aerial photos

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## ***Air Dispersion Modeling***

- Estimated building dimensions
  - If no data available in inventories or identifiable from aerial photos
- Horizontal set to 40 m x 40 m
  - Makes building height controlling factor for downwash effects
- Heights estimated as the greater of
  - $[\text{Stack height (m)} / 1.5] - 0.1$ , or
    - Produces worst-case downwash effects
  - 3.66 m = 12 ft = single-story
    - Lower bound for building-mounted vents

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## ***Air Dispersion Modeling***

- HAP compounds modeled
  - Compounds listed in TRI and AZ HAP Inventory
  - Added any additional compounds found in County inventories
  - All compounds for a facility were modeled
- HAP sources modeled
  - Only those stacks identifiable as having HAP emissions were considered
  - Some inventories only identified stacks as VOC or HAP, without specific compounds

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## ***Air Dispersion Modeling***

- Emission Rates
  - Goal was to use Potential to Emit (PTE) for all sources
  - PTE was available from inventories for many sources
- Where PTE was not available
  - Hours of operation were considered (if available)
    - Actual emissions were prorated using ratio of 8,760 hours to operating hours
  - If no PTE or operating hours were available, TRI reported emissions were used
- If multiple emission rates were available, maximum rate was used
  - ADEQ / County inventories (PTE), or TRI

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## ***Air Dispersion Modeling***

- Source characteristics
  - Individual sources used where identified
  - Capped or non-vertical stacks modeled with exit velocity of 0.001 m/s
  - Multiple stacks with identical characteristics (except for emissions)
    - Considered as a single stack
  - Multiple general HAP stacks without individual compound emission rates
    - Screened to identify worst-case dispersion stack

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## ***Air Dispersion Modeling***

- A total of 64 facilities were modeled
- Not all facilities modeled
  - Modeled facilities in each SIC only until any one met listing criteria
  - No further facilities modeled in that SIC code
- A total of 41 SIC codes were modeled
- 28 SIC codes met listing criteria

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## ***Example Facility #1***

- Nucor Steel Kingman (North Star Steel)
  - SIC 3312, Blast Furnaces & Steel
- Manganese & nickel emissions identified by inventories
  - ADEQ supplied PTE
  - Focus on nickel for this example
- Two stacks identified as HAP sources
  - Both tall, uncapped furnace stacks
  - Emission rates provided for each stack

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## ***Example Facility #1***

- Each stack modeled separately
  - Reheat Furnace
  - Arc Furnace
- Model run using 1 g/s emission rate
  - Peak 1-hour impacts
    - Reheat Furnace =  $50.1 \text{ } (\mu\text{g}/\text{m}^3) / (\text{g}/\text{s})$
    - Arc Furnace =  $120 \text{ } (\mu\text{g}/\text{m}^3) / (\text{g}/\text{s})$
  - Scaled using nickel emission rate
  - Factor of 0.08 used to convert to annual average

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## ***Example Facility #1***

- Nickel emission rates
  - Reheat Furnace =  $1.32 \text{ lb/hr} = 1.66 \times 10^{-1} \text{ g/s}$   
= 0.166 g/s
  - Arc Furnace =  $8.59 \times 10^{-3} \text{ lb/hr} = 1.13 \times 10^{-3} \text{ g/s}$   
= 0.00859 lb/hr = 0.00113 g/s

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## ***Example Facility #1***

- Ambient concentrations calculated
  - Total = (Reheat Furnace) + (Arc Furnace)
  - 1-hour Total =  $8.34 + 0.135 = 8.47 \mu\text{g}/\text{m}^3$
  - Annual Total =  $0.667 + 0.0108 = 6.78 \times 10^{-1} \mu\text{g}/\text{m}^3$   
 $= 0.678 \mu\text{g}/\text{m}^3$
- Total concentrations compared to nickel AACs
  - 1-hour (Acute) = 0.17% of AAC
  - Annual (Chronic) = 8,578% of AAC

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## ***Example Facility #2***

- Wallnox Enterprises dba Desert Sun Fiberglass
  - SIC 3089, Plastic Products (not elsewhere classified)
- Styrene only HAP identified by inventories
  - Facility total emissions = 73,964 lb/yr (TRI)
  - Operating hours = 2,080 hr/yr (Maricopa Co.)
- Three stacks identified as VOC/HAP sources
  - All designated capped
  - No stack-specific emission rates

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## ***Example Facility #2***

- Chose worst-case dispersion stack based on procedures in approach document (Stack 1)
- All styrene emissions modeled using Stack 1 characteristics
  - Exit velocity changed to 0.001 m/s due to obstruction
- Model run using 1 g/s emission rate
  - Peak 1-hour impact =  $29,880 \text{ } (\mu\text{g}/\text{m}^3) / (\text{g}/\text{s})$
  - Scaled using styrene emission rate
  - Factor of 0.08 used to convert to annual average

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## ***Example Facility #2***

- Styrene emission rate
  - Calculated from operating hours & annual emissions
  - $(73,964 \text{ lb}/\text{yr}) / (2,080 \text{ hr}/\text{yr}) = 35.6 \text{ lb}/\text{hr} = 4.48 \text{ g}/\text{s}$
- Ambient concentrations calculated
  - 1-hour =  $1.34 \times 10^5 \text{ } \mu\text{g}/\text{m}^3$  (134,000)
  - Annual =  $1.07 \times 10^4 \text{ } \mu\text{g}/\text{m}^3$  (10,700)
- Concentrations compared to styrene AACs
  - 1-hour (Acute) = 24.2% of AAC
  - Annual (Chronic) = 1,030% of AAC

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